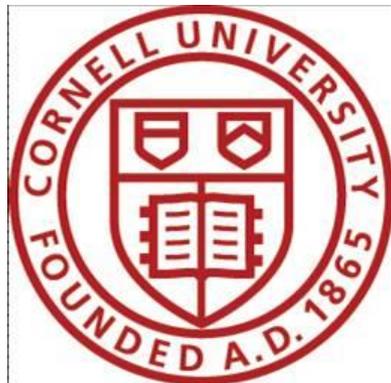

Capitalizing on forages to reduce purchases of high-priced corn and soybeans



Dr. L. E. Chase
Department of Animal Science
Cornell University

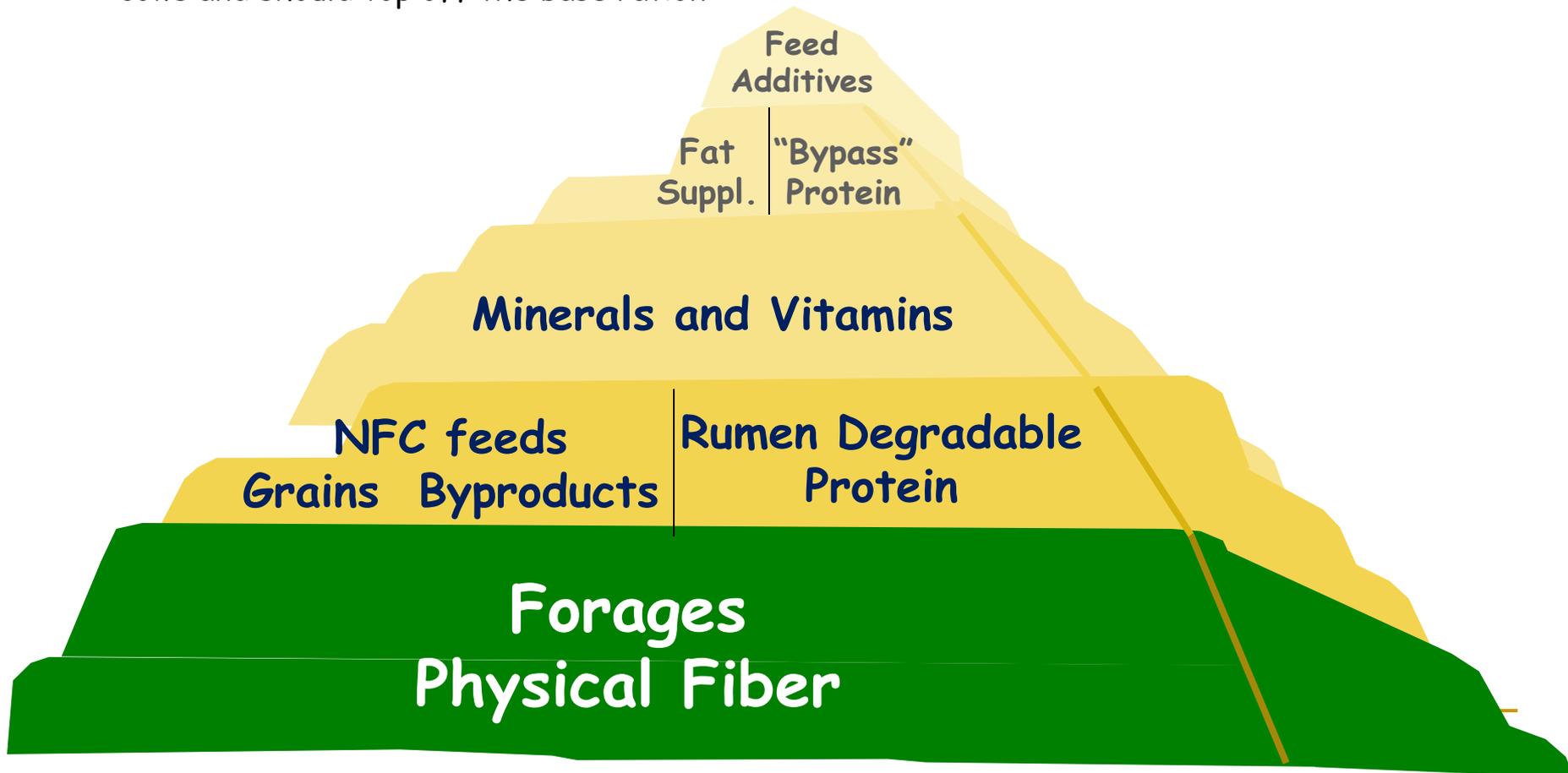
Forages

- **Foundation upon which nutritionally sound and economical dairy rations are built**
 - **High quality forage = less grain & improved income over feed cost**
 - **Forage quality impacts intake, milk production and animal health**
 - **Are the primary source of “effective” fiber**
 - **Improves whole farm nutrient balance**
-

The Feed Pyramid

(Rick Lundquist, 1995)

Use the Feed Pyramid to think about how rations should be formulated and cows fed. A basic ration with high quality forages (bottom three sections of pyramid) should support up to 75 lbs (or more) of milk per day. Fats, bypass proteins and feed additives are needed by higher producing cows and should top off the base ration



Dave Smithgall - 2005

- **“Your nutritionist is only as good as your forage”**
 - **Dairy producer**
 - **Western New York**
 - **900 cows**
-

What Does Your Forage Customer Want?

- A consistent supply of
 - High quality
 - High digestibility
 - “Effective” physical fiber
 - Palatable
 - Well-fermented silage



How Much Forage Can we Feed?

- Depends on
 - Quality (NDF level)
 - Digestibility
 - Particle size
 - Inventory (how much is available)
 - Rate of passage
 - Palatability
 - Animal body weight, milk production
-

How Does NDF Hinder the Cow?

Rumen Fill Limits Intake

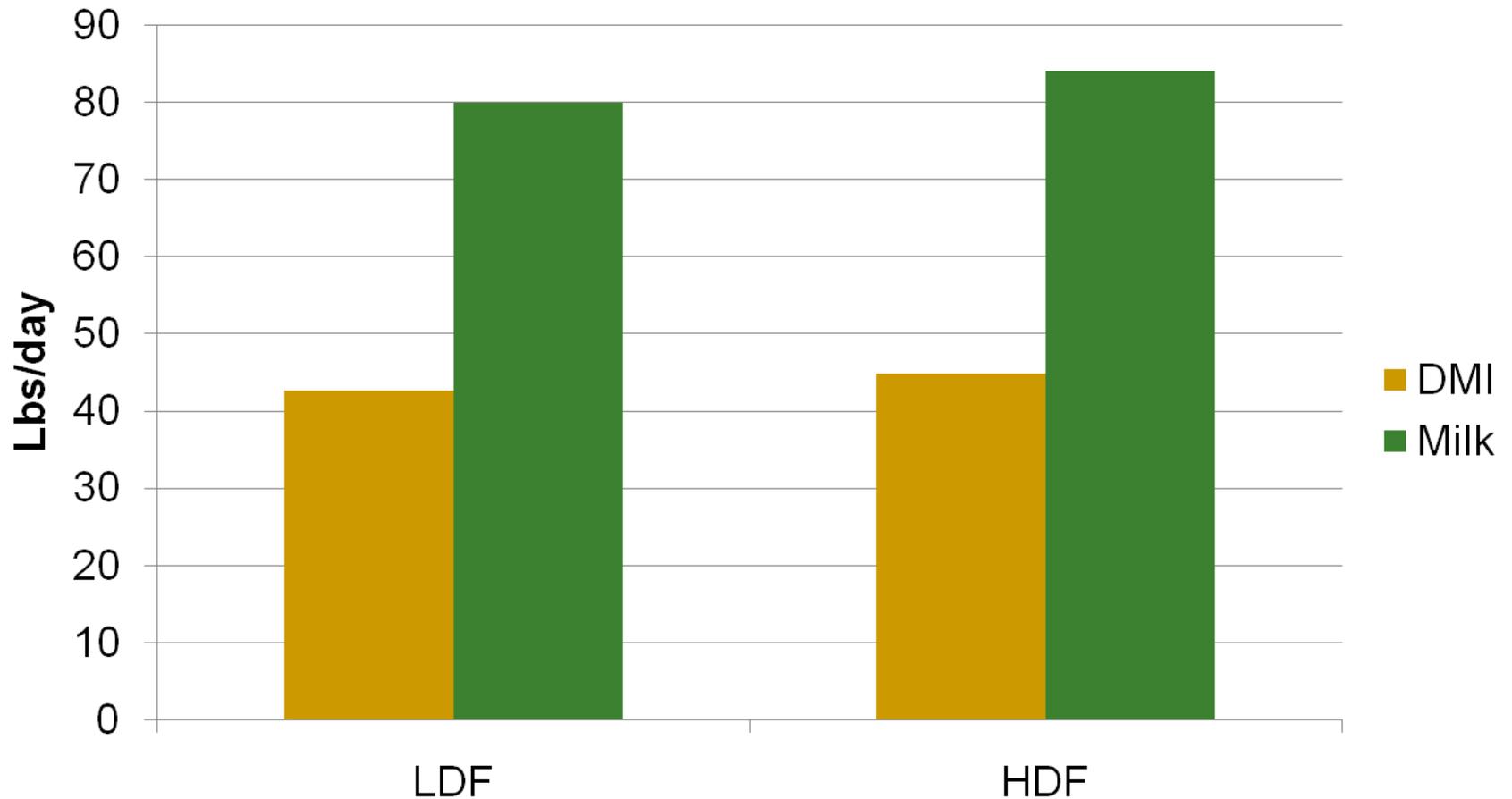
High-Producing Cows With a Well-Functioning Rumen Are Limited In Forage Intake By the **BULKINESS** of the Fiber which Fills up the Rumen.

This **Bulkiness** is best estimated by the **Forage NDF Content & NDF Digestibility**

NDFD, Intake and Milk

- Dado & Allen, 1996
 - Used 2 alfalfa silages with similar NDF (39 & 41%)
 - NDFD's were 45 and 48 (24 hour in vitro)
 - Early lactation cows
 - Goal – 35% NDF in total diet
 - Alfalfa silage was 83% of total diet DM
-

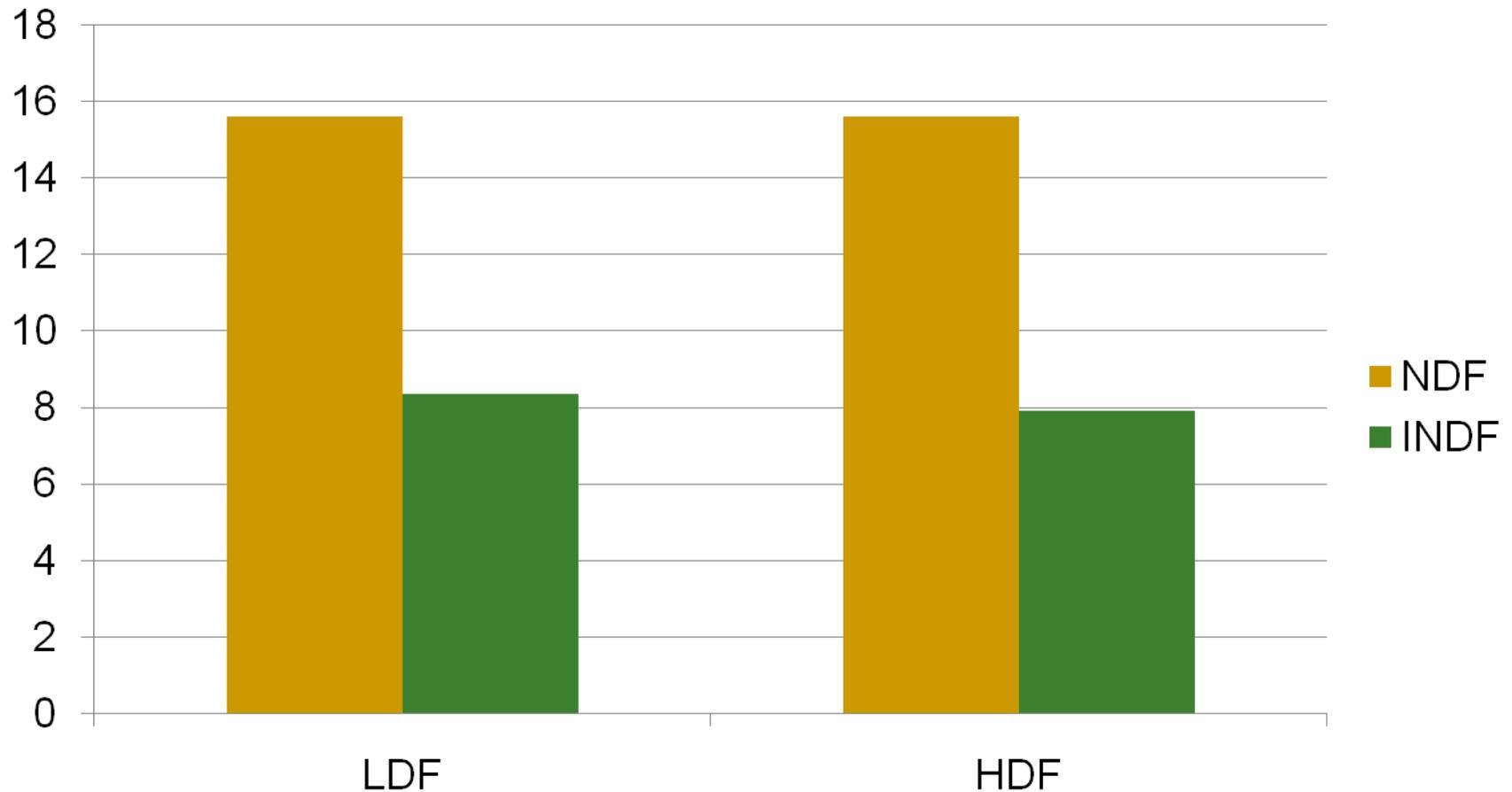
NDFD, Intake and Milk



DMI = +2 lbs, Milk = + 4.2 lbs

Dado & Allen, 1996

NDF and Indigestible NDF Intake, lbs/day



Field Observations

- **In the last 5 – 10 years, the quantity of forage fed in many New York dairy herds has increased**
 - **Why?**
 - **Improved forage quality**
 - **Greater quantities of forage available?**
 - **Better hybrids and varieties**
 - **Herd health and acidosis problems?**
 - **Better understanding of formulating rations with higher forage levels**
 - **Other herds are doing it**
-

NDF Intake

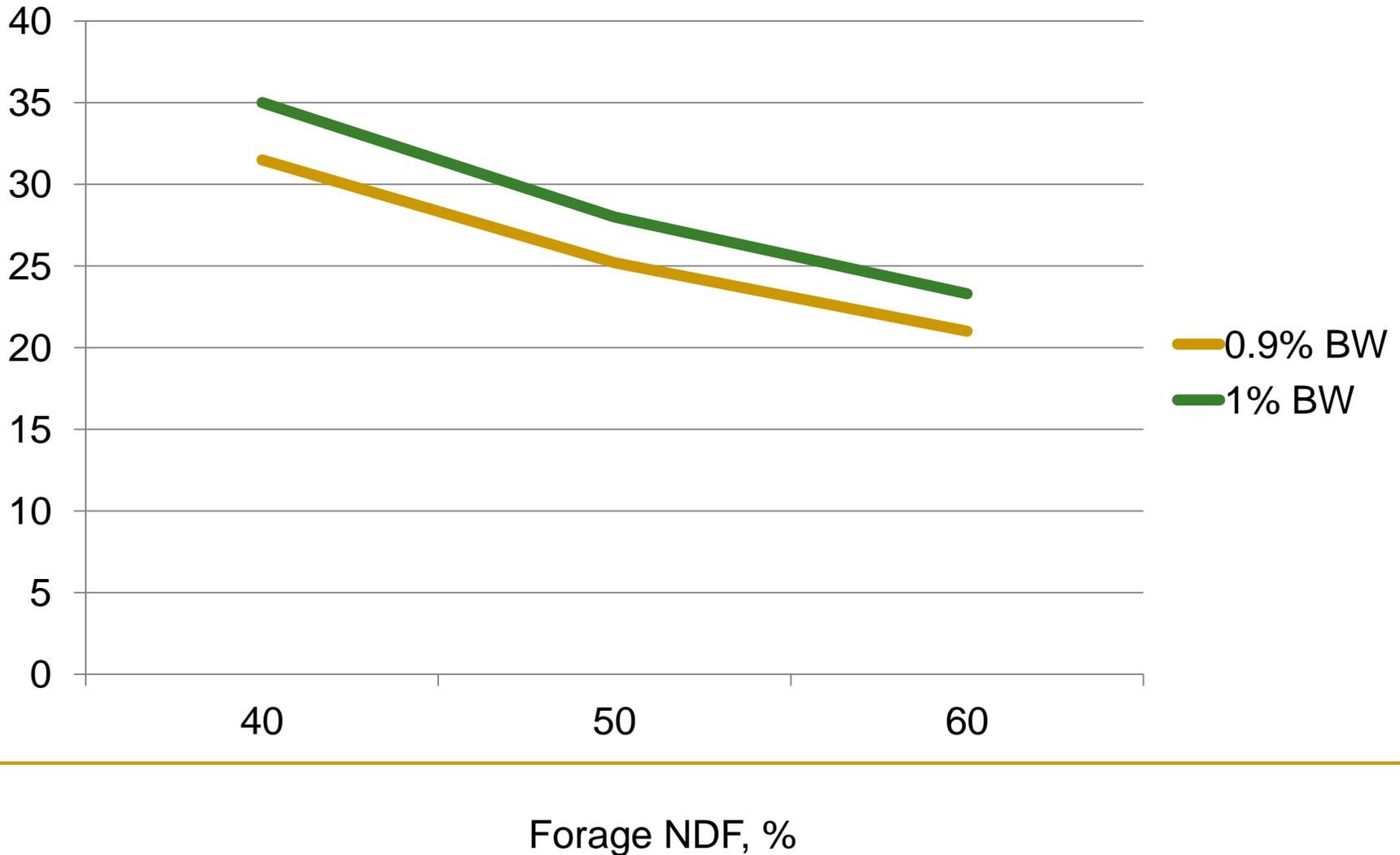
- Dr. Dave Mertens guidelines:
 - Total NDF intake = 1.2% BW
 - 75% from forage
 - 0.9% of BW as forage-NDF
 - In the field, many herds have fed <0.9% of BW as forage-NDF
 - WHY??
 - Can we feed > 0.9% BW as F-NDF?
-

Applying the Concept of Forage-NDF as a % of Body Weight

- Example:

- 1400 lb dairy cow
 - F-NDF intake = 0.9 or 1% of BW
 - $1400 * 0.009 = 12.6$ lbs. F-NDF
 - $1400 * 0.01 = 14$ lbs of F-NDF
 - Forages are 40, 50 or 60 % NDF
-

How Many Pounds of Forage Dry Matter?



What Are The Potential Benefits?

- **Better rumen health (less acidosis)**
 - **Decreased cull rates**
 - **Improved milk components**
 - **Less purchased feed cost**
 - **Improved opportunity for profit**
 - **Lower vet bills**
 - **Improved whole farm nutrient balance**
-

How Much Forage Can Cows Actually Consume?

- **Cows on pasture -**
 - **Well managed, rotationally grazed pasture Literature reports = 1.3 – 1.5% of BW as F-NDF**
 - **This equates to 200-250 lbs. of wet pasture intake per day for a 1400 lb. cow**
 - **Similar intakes for green chop forages**
-

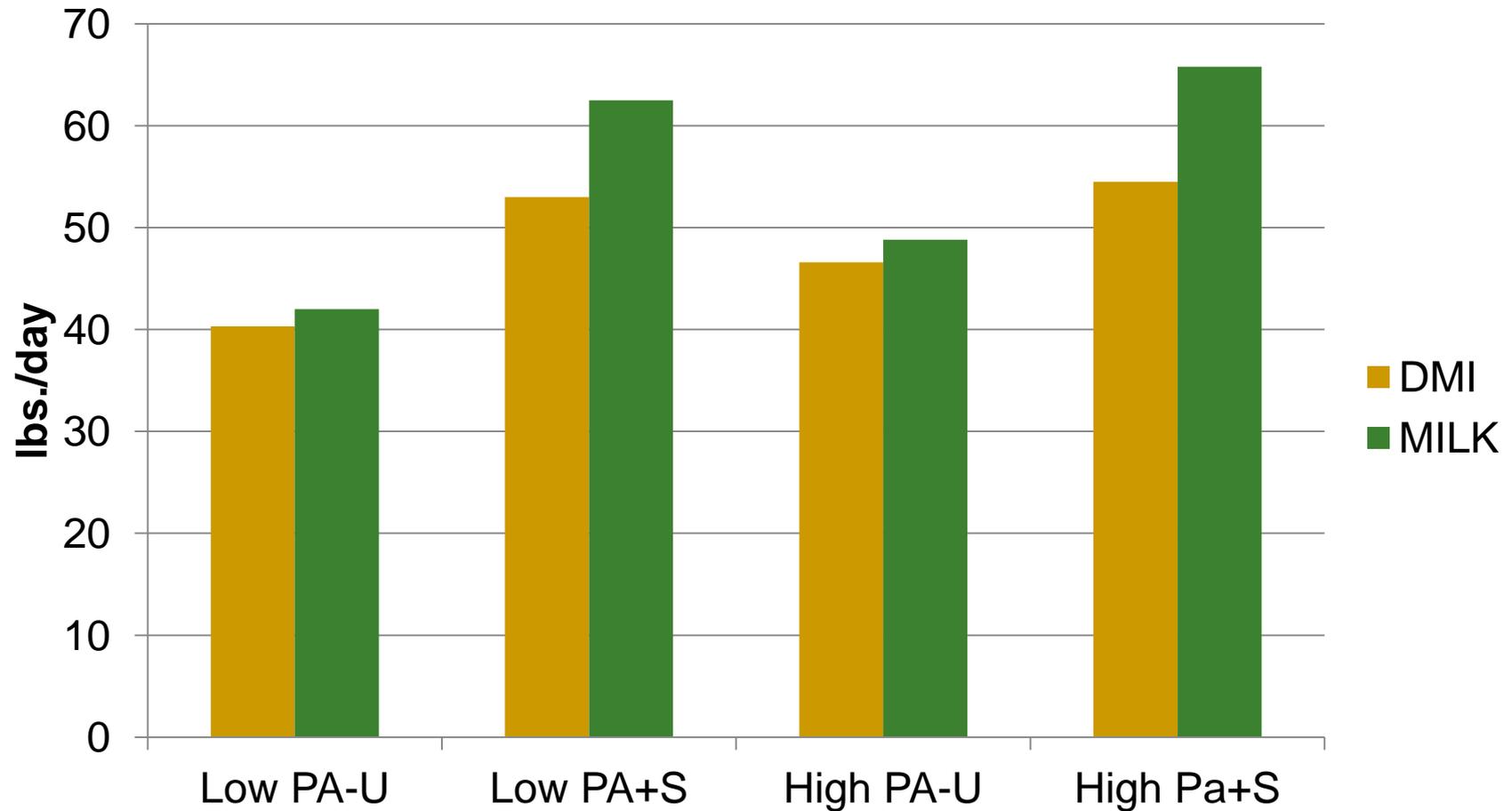
What About Data from Controlled Research Trials?

- Forage NDF content = 34 to 56%
 - Forage = 51 to 84% of total ration DM
 - Milk = 71 to 93 lbs. per day
 - F-NDF intake = 12 -15.5 lbs./day
 - F-NDF intake = 0.95 – 1.17% of BW
 - Why do many dairy herds feed < 0.9% of BW as F-NDF?
-

Can We Feed 100% Forage (and no grain)?

- Yes, some pasture herds do this
 - Milk production will be reduced
 - Bargo & Muller – Penn State – 2002
 - Fed mixed grass pastures at 2 levels of forage availability with:
 - No supplemental grain
 - 1 lb. grain/4 lbs. milk
 - Pasture NDF = 55%
-

Bargo & Muller, 2002



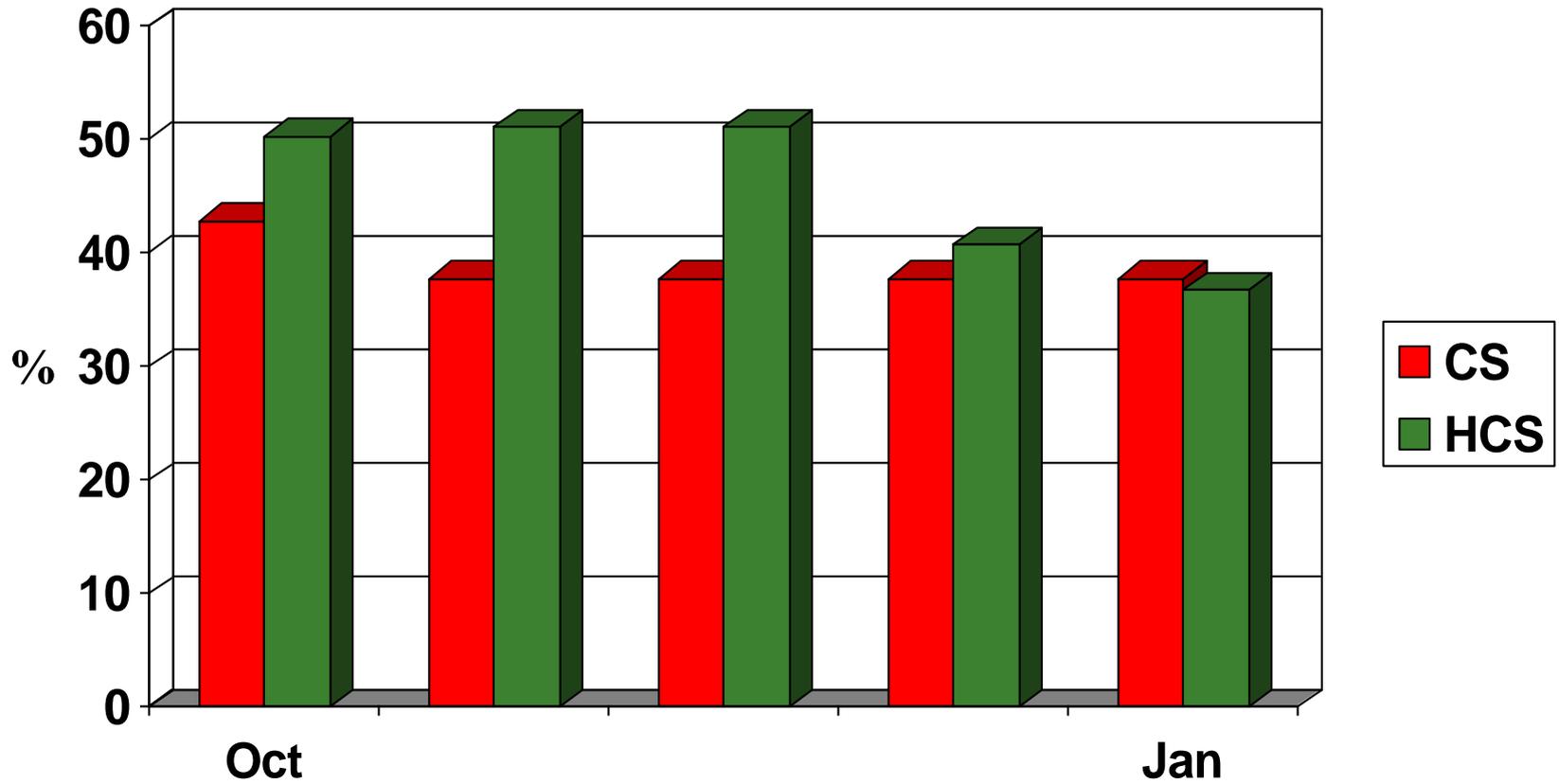
Low = 55 lbs DM/cow High = 88 lbs DM/cow

Does The High Forage Concept Work in “Real” Herds?

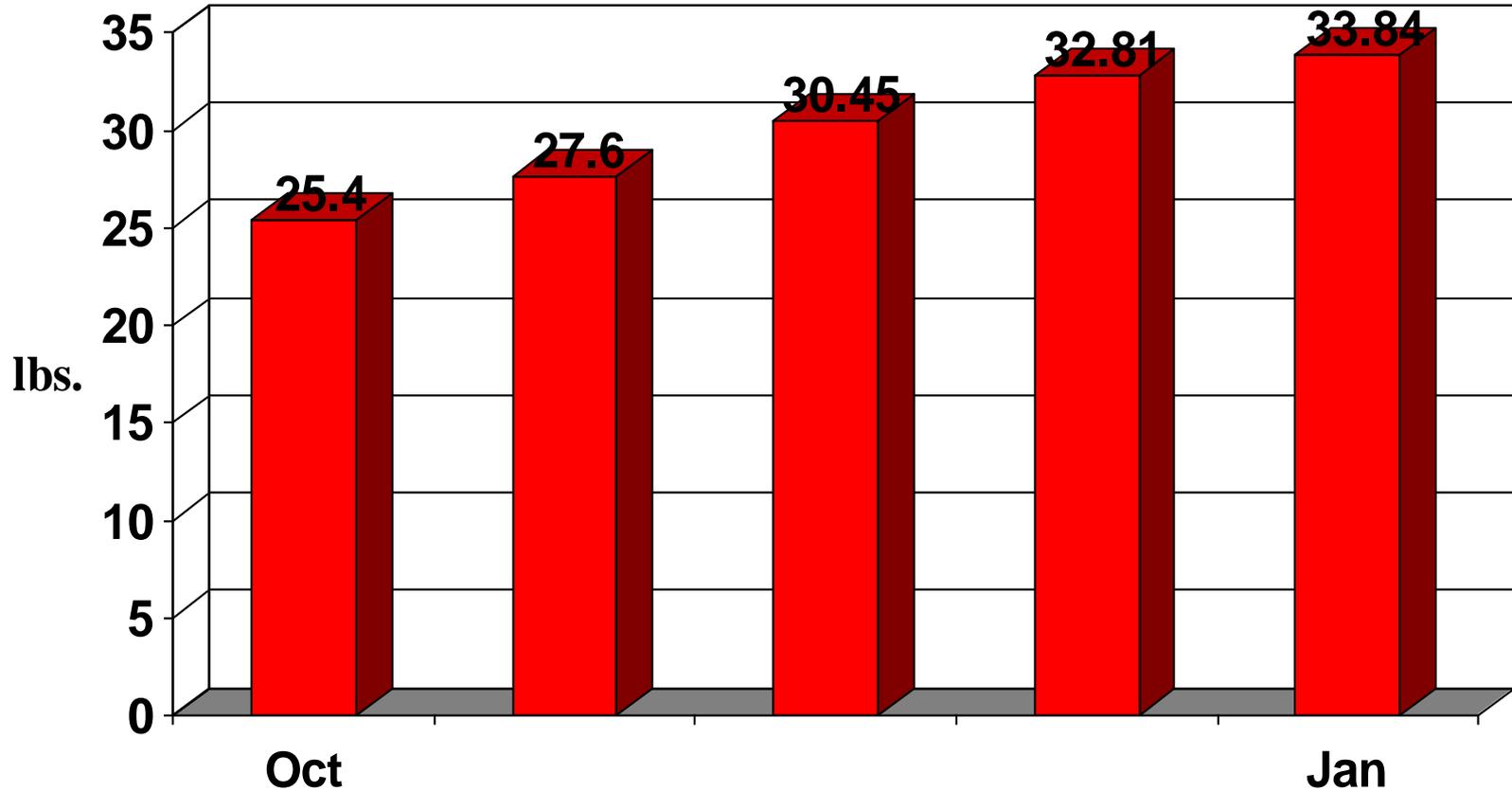
Increasing Forage Intake

- New York dairy herd
 - Time frame is October, 2001 through January, 2002
 - Increased forage in the ration as forage NDF decreased
 - About 100 cows
 - Tie-stall barn, fed a TMR
-

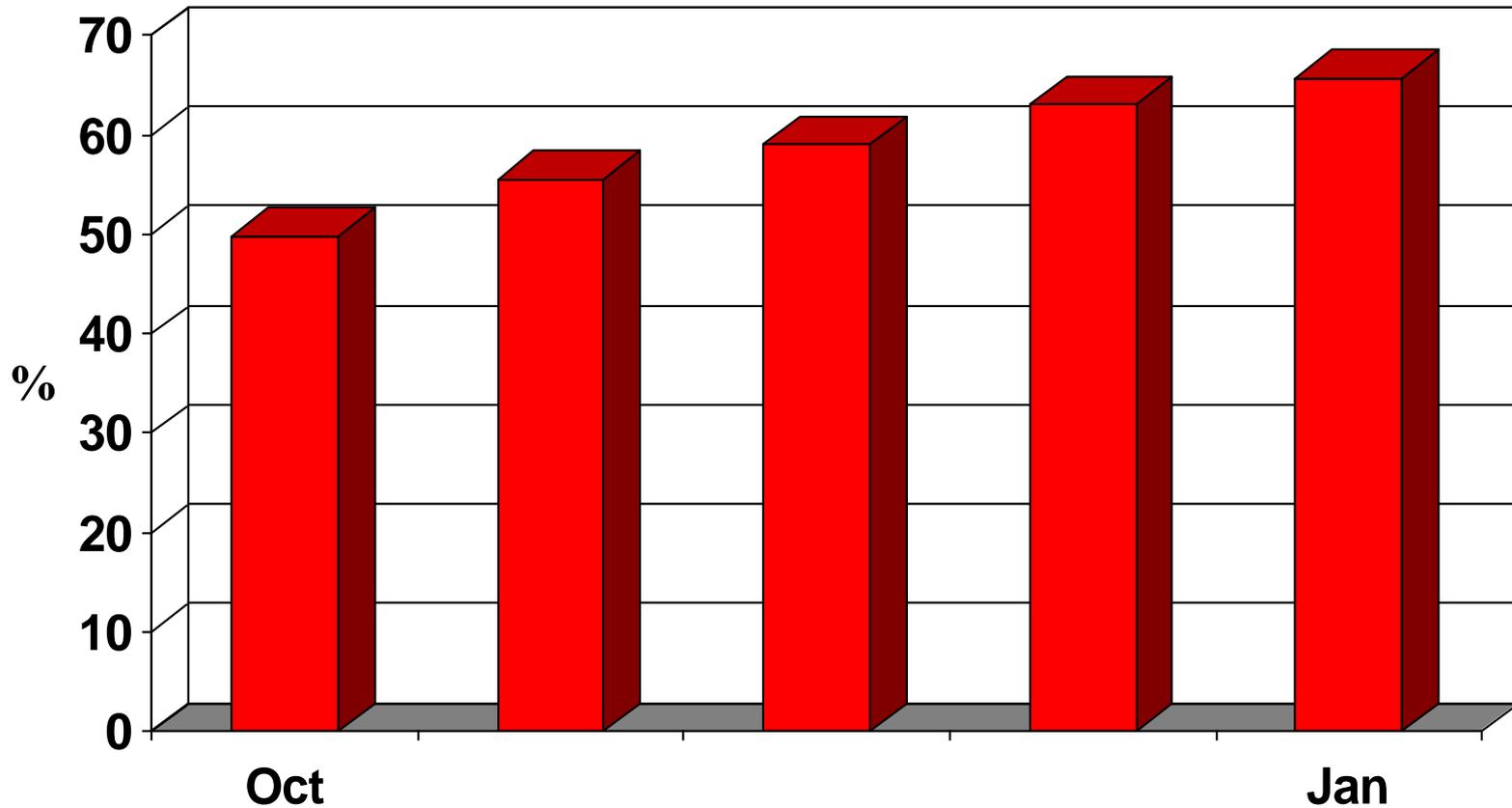
Forage NDF Levels



Pounds Forage DM Fed



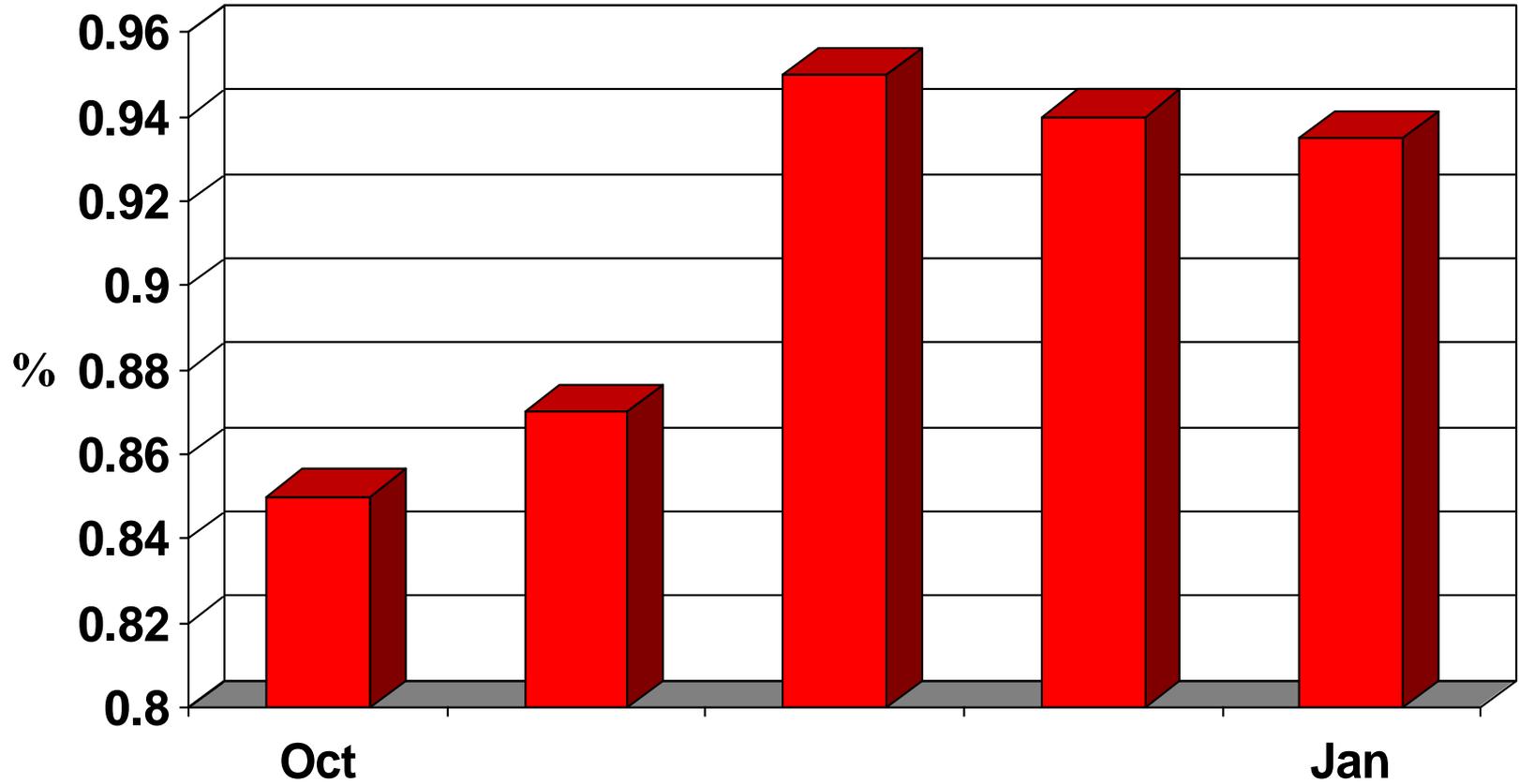
% Forage in Ration



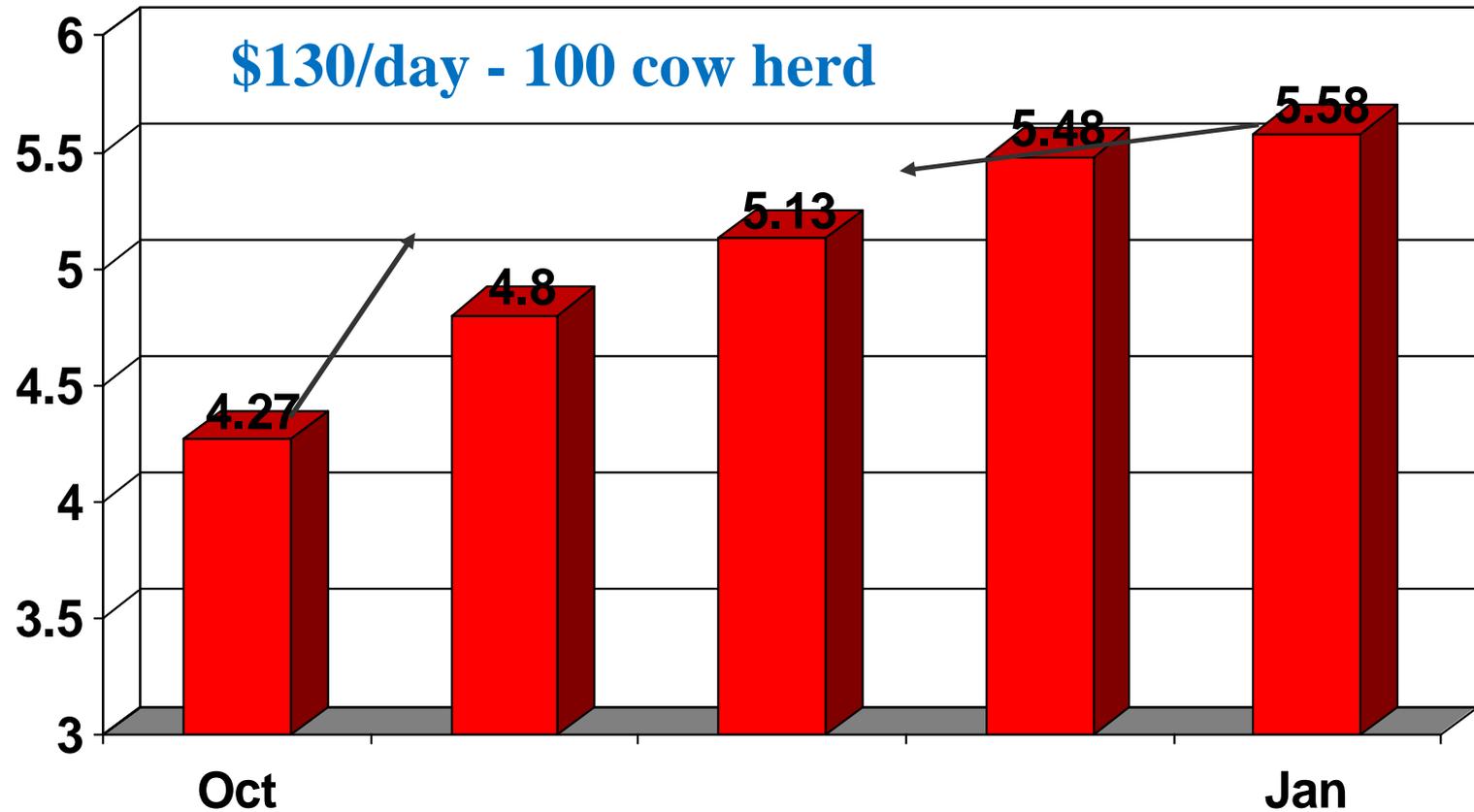
Milk = 71lbs/cow

75 lbs/cow

Forage-NDF, % of BW



Income Over Feed Cost, \$/cow/day



Additional Comments

- Herd nutritionist-
“Over this period, increased forage, decreased grain, increased milk and increased profits - neat!”
-

The Rest of the Story

- In the last year, there have been some variations in forage quality on this farm
 - Forage has been as low as 50% of the total ration dry matter (due to higher NDF forages)
 - It is now back to >60% forage as NDF levels have gone back down
-

Recent Herds

Herd	A	B	C	D	E	F
Milk, lbs	105+	85	110+	80-85	81	80
% Forage	62	65	64	74	78	65
F-NDF, %DM	26	28	26.4	31.3	33	30
F-NDF, %BW	0.92	1	1.06	1/15	1	1.06
Fat, %	3.8	3.9	3.4	4	4.2	4
TP, %	3.1	3	3.1	3.15	3.18	3/1

Forage (as % of Total Forage)

Herd	A	B	C	D	E	F
BMR-CS	56	-	27	-	-	-
Conv. CS	-	72	52	60	60	50
Haylage	41	28	21	40	40	50
Hay	3	-	-	-	-	-

Northern New York Herd – Loren Benware

- Hoard's Dairyman – September, 2009
 - 140 cows, milk sold = 25,756 lbs milk
 - Forages are grasses, MML and high chopped corn silage
 - Ration is 29% haylage, 43% corn silage and 28% grain
 - Total ration NDF = 34-35%, F-NDF is 30-33%
 - Key = Highly digestible forages
-

Loren Benware – Key Points

- Haylage is stored in Ag-bags
 - Corn silage is stored in both upright silos and Ag-bags
 - 125 acres corn silage (cut at 24 inches)
 - 125 acres MML silage
 - 100 acres mostly grass silage
 - Low herd health problems
-

Keys to Moving to a High Forage Ration – Loren Benware

- Consistent supply of high digestibility forage
 - A consultant who understands and believes in high forage rations
 - Be patient- it takes time to make the change
 - You have to monitor forage DM
 - Is your mixer big enough?
-

What Are the Risks or Challenges of Feeding Higher Forage Rations?

■ 1. Mindset -

- Both the dairy producer and nutritionist need to believe in the concept.
- If they don't, it has a high risk of failure

■ 2. Consistent quality forages -

- As you feed more forage, less grain is fed to balance forage composition
 - Forage quality variation will be more evident
-

Risks and Challenges - 2

- **3. Forage inventory -**
 - You will need more forage to feed the same number of cows
 - This may be 15-30% more forage
 - Make sure you have enough forage in storage before feeding higher forage rations
 - Do frequent forage inventories
 - It may take time to revise the forage program to produce enough forage
-

Risks and Challenges - 3

- **4. Forage allocation and storage -**
 - Can forages be stored by quality?
 - Can specific forages be allocated to specific animal groups?
 - **5. Forage analyses -**
 - More frequent to keep feeding program on target
 - Include NDF digestibility
 - More frequent determination of forage DM and ration adjustment
-

Risks and Challenges - 4

- **6. Ration formulation -**
 - Rations need to be checked more frequently to keep the program on target
 - **7. Feeding management -**
 - Goal = A consistent supply of a fresh, palatable and high quality ration in front of the cow throughout the day
 - May require feeding management changes
-

How Do We Implement the Program?

- Assume that we have an adequate supply of high quality forage
 - Forage testing – include NDFD
 - Set ration forage content using F-NDF as a % of BW (0.9 to 1%)
 - Monitor & adjust for changes in forage DM
 - Track intake and refusals (sorting, etc.)
 - Watch milk & milk components
-

How Do We Make the Ration Changes?

- Conservative:
 - Move forage % in the ration up 2-3 units and watch intake and milk
 - Continue until you get the ration forage level desired (or the cows tell you to stop)
 - Radical:
 - Just make 1 big change and let cows adjust (may take 1-2 weeks)
 - Decision of the dairy producer
-

Summary

- Feeding higher forage rations is an opportunity that should be evaluated in dairy herds
 - This takes advantage of the biology of the cow
 - The key to success is having adequate quantities of consistent, high quality forages available on the farm
-

Summary - 2

- Potential benefits include:
 - Higher levels of milk components
 - Improved cow health
 - Improved profitability

 - It does require a higher level of management in both forage production and herd management
-